CLAIMS

What is claimed is:

1. A method of optimizing a mobile radio network topology for an N node network, each node having K connecting links, the method comprising the steps of:

establishing a base network topology and determining a cost value for the base network;

determining if all possible local transformations on the base network topology have been performed, and if not;

performing a local transformation on the base network to form a transformed network;

calculating a cost for the transformed network;

comparing the cost of the transformed with the cost of the base network; and

establishing the transformed network as the base network if the cost of the transformed network is less than the cost of the base network.

2. The method of claim 1, further comprising repeating the steps, if the cost of the transformed network is not less than the cost of the base network, of:

determining if all possible local transformations on the base network topology have been performed, and if not;

performing a local transformation on the base network to form a transformed network;

calculating a cost for the transformed network;

comparing the cost of the transformed with the cost of the base network; and

establishing the transformed network as the base network if the cost of the transformed network is less than the cost of the base network.

3. The method of claim 1 further comprising repeating the steps, until all possible sequences of local transformations have been exhausted, of:

determining if all possible local transformations on the base network topology have been performed, and if not;

performing a local transformation on the base network to form a transformed network;

calculating a cost for the transformed network;

comparing the cost of the transformed network with the cost of the base network; and

establishing the transformed network as the base network if the cost of the transformed network is less than the cost of the base network.

4. The method of claim 1 wherein the step of performing a local transformation comprises the step of adding a new link in the network and deleting an old link in the network, generally by exchanging branches of the network topology, wherein connectivity between the nodes of the network is maintained.

5. The method of claim 1 may be constrained in various manners, as for instance, the step of performing a local transformation further comprises the step of maintaining a minimum of one link per node and a maximum of three links per node.

6. The method of claim 1 wherein the candidate configuration is a ring structure and wherein each node has at least two links.

7. The method of claim 6 further comprising the step of adding to the ring structure all nodes having one or three links available.

8. The method of claim 1 wherein the step of performing a local transformation comprises the steps of:

defining a starting node position for the candidate configuration;

exchanging a node in the starting node position with a next node in a position subsequent to the starting node position and determining a new cost for the test configuration formed by the exchange; and

repeating the step of exchanging for each node N in the candidate configuration subsequent to the starting node until the new cost is less than the starting cost, wherein the test configuration is accepted as a new configuration.

9. The method of claim 8 further comprising the step of repeating the step of exchanging the node in the starting node position for the new configuration, wherein the step of exchanging starts with the node in the new configuration that has not been exchanged with the node in the starting position.

10. The method of claim 8 further comprising the step of repeating the step of exchanging the node in the starting node position for the new configuration, wherein the step of exchanging starts with a node in the new configuration in a first node position subsequent to the node in the starting position.

11. A method of optimizing a loop network comprising the steps of:

determining an initial cost value for an initial loop network;

switching at least two links in the initial loop network forming a new loop network;

determining a new cost value for the new loop network; and

determining if the new cost value is less than the initial cost value, and if so establishing the new loop network as a base loop configuration for the loop network.

12. The method of claim 11 further comprising repeating the steps, if the new cost value is not less than the initial cost value, of:

switching at least two links in the initial loop network to form a new loop network;

determining a new cost value for the new loop network; and

determining if the new cost value is less than the initial cost value, and if so establishing the new loop network as a base loop configuration for the loop network.

13. The method of claim 11 further comprising the steps of:

determining if all desired replacement links have been tested; and if not repeating the steps of:

switching at least two links in the initial loop network to form a new loop network.

14. The method of claim 11 further comprising the step of establishing the base loop configuration as a final loop configuration as a final loop network configuration if all desired link replacements have been tested.

15. The method of claim 11 further comprising the step of:

forming an initial crosslink network for the final loop network in combination;

calculating an initial cost value for the initial crosslink network and find loop network combination;

switching at least two cross links to form a new loop and crosslinks comb and determine a new cost value for the new loop and crosslink combination; and

determining if the new cost value is less than the initial cost and if so, establishing the new cost value as the initial cost value for the loop network.

16. The method of claim 15 wherein the step of determining an initial cost value for the loop and crosslink combination comprises the steps of:

determining all least hop paths from each node in the loop network to all other nodes in the loop network;

calculating a cost value for each path; and

computing a sum of the cost value for each path to determine an overall cost value for the loop network.

17. A computer program product comprising:

a computer useable medium having computer readable program code means embodied therein for causing a computer to optimize a loop network, the computer readable program code means in the computer program product comprising:

computer readable program code means for causing a computer to determine an initial cost value for an initial loop network configuration;

computer readable program code means for causing a computer to switch at least two desired replacement links in the initial loop configuration to form a test configuration;

computer readable program code means for causing a computer to determine a new cost value for the test configuration;

computer readable program code means for causing a computer to accept the test configuration as an initial loop configuration if the new cost value is less than the initial cost value;

computer readable program code means for causing a computer to determine if all desired replacement links in the initial loop configuration have been tested; and

computer readable program code means for causing a computer to accept the initial loop configuration as a final loop configuration if the new cost value is less than the initial cost value and all desired replacement links have been tested.

18. The computer program product of claim 17 further comprising:

computer readable program code means for causing a computer to form an initial crosslink network with the final loop network in combination;

computer readable program code means for causing a computer to calculate an initial cost value for the initial crosslink network and find loop network combination;

computer readable program code means for causing a computer to switch at least two crosslinks to form a new loop and crosslink comb and determine a new cost value for the new loop and crosslink combination; and

determining if the new cost value is less than the initial cost and if so, establishing the new cost value as the initial cost value for the loop network.